

## Proposal of a model to use Refugos in the timber industry Catarinense

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**Abstract:** Each year the timber industry develops to obtain more sustainable products, not degrading nature and increasingly renewable, this prominent position, makes growth continuous and necessary for renewal. However, this follow-up still lacks a lot of effective management, so the PDP is an interesting approach to achieving important results in the business of this sector. With the execution of the current state map to analyze the current moment of the company and subsequently use the PDP with aid in Lean You can measure financial results, identify business opportunities and also show other actions of Improvements in other company processes. Thus, the application of the PDP with Lean aid in the timber industry will bring returns as improvements in waste reduction and adding value to this type of activity.

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### I. Introduction

According to ABIMCI (2014) The forestry sector is divided into two groups of products, loggers and non-timber companies. The timber sector has the segment of products such as mechanically processed wood, cellulose, paper, panels, among others. Mechanically processed timber can be highlighted as lumber, blades, wood sheets making them more specific products such as frames, doors, windows, floors and furniture.

The world's leading timber producing countries are: USA, Russia, Canada, Japan, Sweden, Germany, Poland, France, Finland and Brazil. The various types of wood such as mahogany, Ebony and rosewood are produced in Asia-Tropical, Latin America and African countries, geared towards furniture manufacturing. Wood extracted from wide-leaf trees is called wood, but the woods extracted from cone-bearing trees is called SOFT WOOD (floema, 2018).

According to Kanh et al. (2006) Apud Toledo et al. (2008) The academics and companies see more and more research on PDP to understand this relationship between action and success and how to apply such practices to the procedures of companies and their specific organizations. This line of identification of success factors of the PDP in the area of management is the discrimination of practices (best Practices), when executed there is a contribution to the reduction of the indecision to the launching of new products.

Lean thinking consists of a demand for maximising value through reduction or even elimination of waste, through the practice of continuous improvement. It can be said that Lean is a category of tool, whose thought is geared towards practices and results of the Toyota production SYSTEM (WARING JJ, BISHOP S, 2010; JACOBS FR, CHASE RB, 2009; PINTO J, 2009).

This article aims to better understand the dynamics promoted by the timber industry and seek solutions to generate new business opportunities with the PDP and the help of Lean analysis to add value in this branch.

### II. Literature Review

Develop the PDP with the Lean approach to foster opportunities for new products for the Santa Catarina timber industry.

### III. Timber Industry

The timber industry is geared towards the production and harvesting of trees, where the uses vary, such as the manufacture of telegraph poles, civil construction, naval and furniture, directly used, but can also be converted into paper, chemicals and Pulp.

The advance of logging took a very intense aspect, becoming critical. In the year 1979 was extracted about 8.4 million cubic meters of wood in the northern region of the country, which equals 26.63% of the total Brazilian territory. After 6 years, there was another withdrawal of 20 million meters, equivalent to 46.16% of the total Brazilian territory.

The main concern is the level of replenishment of species that is negligible, approaching in 200 species extracted for commercial purposes, but 60% of the production of lumber and laminated is 10 species. The states that most select this type of exploration is Rondônia and Pará, where this extraction seems to have reached an exponential growth (UHL & VIERA, 1991, p. 110; KITAMURA, 1994, p. 94; BARROS & VERÍSSIMO, 1996, p. 1; LISBOA, 1989; LISBOA, 1990).

This sector is of great importance for its performance presented during the centuries, with the ability to change in the raw material wood in products and services. With this, it has a positive impact on the economy of the country, this sector is responsible for about 4.5% of gross domestic product (GDP), employing about 6.5 million people, approximately 9% of the economically active population. Exports become important because it contributes to the trade balance by decreasing the foreign dependence of capital that the country has.

Because of this and segmented factors, that the timber industry has a great potential for growth and innovations and the PDP with the Lean approach and its organizational structure, it will be possible to have better performance in the current market.

#### **IV. Product Development Process (PDP)**

Ferreira (2006) is based on that the product development process (PDP) is characterized by a high degree of oscillation at the beginning, with everything, is at this time that the results choices are made for the project, among these, determine approximately 85% of the final cost of the product. It is important to make transformations occur in the early stages of development because the cost of these transformations is lower. It is estimated that reductions of more than 50% are possible in the release time of a product when problems can be resolved in advance.

According to Takahashi & Takahashi (2007), a percentage of 70% to 90% of the final cost of products aimed at diversification, quality and time of introduction to the market is aggregated. Therefore, product development is one of the most important processes for value aggregation in the business world.

Nowadays, organizations focus on implementations of Lean concepts in the production processes, others, these implementations are also directed to the product DEVELOPMENT processes (PDP). Most of these companies were able to see a great potential in eliminating waste in early stages of product development (PDP), where the highest costs of the process (LIKER, 2005) are found.

#### **V. Approach Lean**

The lean translated as Slim to Womack et al. (1990), is a concept that has a philosophy of management and organization, has as characteristic:

"... Half the effort of the workers, half of the production space, half the investment in tools, half the hours of planning to develop new products (...) Less than half of the inventory at the workstation, resulting in fewer defects and a Growing variety of products. "

Lean Method Support is the elimination of waste found during production processes. Waste is an element where it only increases costs within the production process and does not add value. Having said that the Lean approach can be applied in any production process of any branch, it can also become an approach to the process OF product development (PDP) (Ohno, 1988).

#### **VI. Lean no PDP**

According to Reinertsen (2005), the lean PDP seeks to apply the principles used in LEAs, where they are applied to create streams where they will make the process more agile and efficient, generating a better opportunity to be more competitive because Puts a new product faster on the market.

To reach the objectives of the lean PDP it is necessary to use simultaneous engineering using sets of possible solutions, involving suppliers and customers, visual management and Teamwork (KARLSSON & ÅLHSTRÖM, 1996).

The concept of Lean and PDP can be distinguished in eliminating waste in the processes, it goes beyond that where the same seeks to maximize the value added to the customer, to shareholders, suppliers, employees, that is, the stakeholders. The main focus is directed at developing the necessary activities by adding value and eliminating process steps that are unnecessary (BROWNING, 2000).

#### **VII. Simultaneous Engineering**

ES determines the completion of several stages of the management processes of a project being it in a non-sequential parallel way. This means that engineering, research, Marketing, production and development must be interacting since the beginning of the project.

Segundo Sobek II et al., 1999 apud Zancul 2006:

"The simultaneous engineering currently practiced in companies is based on parallelism in the execution of activities and aims at anticipating problems, usually through meetings between people in the

functional areas involved. However, these measures are not sufficient to ensure that the marketing plan, the engineering project and the definition of the processes are effectively integrated. "

### VIII. Methodology

The article aims at an exploratory research, this way provides a greater affection with the problem approached making it understandable. With the research, it will be intuitive, therefore, consider the day to day of the processes of a timber industry, thus being able to map and perform analyses for the development of a process of products generated by scrap.

The research process in the present study was debated qualitatively and quantitatively, because in a descriptive way, mappings of all the processes associating to real data, such as costs, movements, number of employees, number of Products, which are the processes used for each product, among others.

In the first stage of this study, we mapped the current state of a small family timber property, in loco, in order to better understand all processes and perform the value analyses to verify the possible application of Product development process with the help of Lean approach in the property under study.

Consequently, in its second stage a market research was carried out in order to find new products and with the help of Lean power reduce processes and thus waste them and add value. Finally, with these researches and analyses carried out, it is expected to propose new business opportunity for the timber industry, following the method of development of new products, with the focus of adding value object of this study and a business model for Small businesses in the Santa Catarina timber industry.

### IX. Current State Map

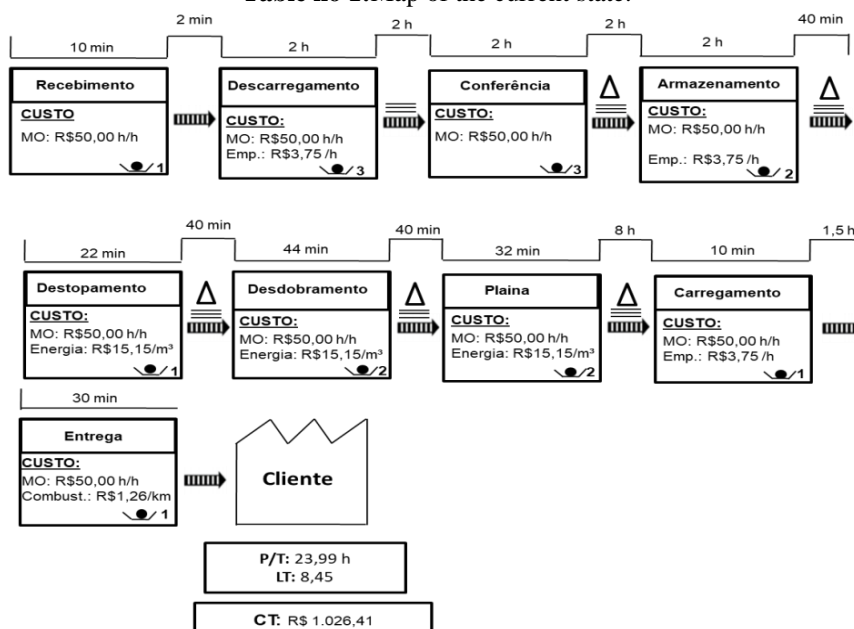
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Table no 1:Map of the current state.



The procedure of the crude wood consists of six steps, this in the basic process without which the final customer requires any cut or which is planed. Processes are receiving, unloading, conferencing, storing, loading and delivering.

The unloading is done by three employees, where one assists on top of the cart, another operates the forklift and the last in the yard, for the assistance of the operator of the machine, the trailer arrives to the company in a palletised way.

Moreover, after discharged it is necessary to be made the conference of the wood that was requested, the sizes and quantities requested. After the conference is made the storage of the wood, continuing with the three employees and the aid of the forklift, as has already been commented the wood comes in palletised form, with this is stored using the machine. Finally the wood can be sold raw the size that was purchased and without being planed. Or you can also go through the process of cutting length, where only one employee can do this procedure, which is called "Destopamento".

The wood can also be unfolded, where it needs two employees for this procedure, because it is a process of opening the wood in half.

Every wood that will be benefited goes through the planer process, it can only be planed that already a beneficiation, but can also be planed and cut to the size that is requested by the customer.

When the woods are benefited they suffer a certain loss depending on what will be transformed, but in the end the waste becomes sawdust. There is a container where this sawdust is stored, after the beneficiations the employees use a sucker, sucking everything into the container, subsequently the sawdust is sold in charge or even donated in small quantities to people who Use with their animals and also the zoo.

The procedures of raw wood and timber benefited are a process only, where, depends on what the customer needs, because, it can only request a wood unfolded without the other two procedures. So the processes are one, but there are products that do not go through them all.

### **X. PDP Model with Lean approach to new products from scrap**

In this topic will be explained how the whole procedure was developed to obtain a final model of the product development process with the aid of Lean for timber industry.

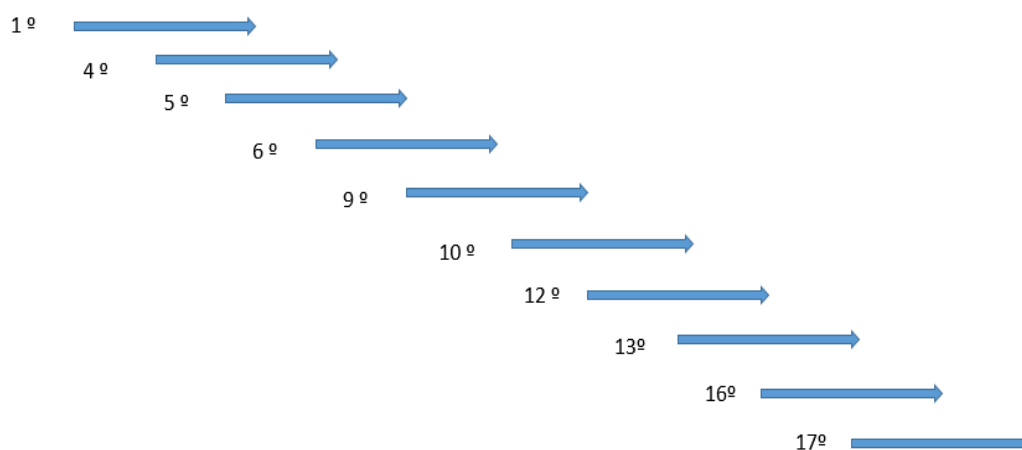
Below is a better way to see existing activities to develop a product development process according to Rozenfield (2006).

From Figure 2 It was analyzed which activities are necessary to develop a product of the timber sector with the application of simultaneous engineering applying the Lean approach in the PDP.

**Table to 2: Product Development process**

<i>Pré desenvolvimento</i>	<i>Desenvolvimento</i>	<i>Pós desenvolvimento</i>
1 - Portfólio de produtos	6 - Projeto informacional (Requisitos com valores meta, informações adicionais qualitativas)	11 - Documento lançado
2 - Minuta de projeto	7 - Projeto conceitual (Arquitetura, alternativas de solução, lista SSCs principais, especificações iniciais SSCs, desenhos iniciais, plano macro)	12 - Especificação de processos de vendas
3 - Plano de projeto	8 - Projeto detalhado (Protótipo funcional, projeto dos recursos, plano de fim de vida)	13 - Especificação de processos de distribuição
4 - Planejamento estratégico de produtos	9 - Preparação produção (Especificações dos SSCs, BOM final, desenhos iniciais, planos de processo, projeto de embalagem, material, liberação da produção, documentos homologação, especificação processo de produção/manutenção, capacitação pessoal)	14 - Especificação de processos de assistência técnica
5 - Planejamento de projeto		15 - Especificação de processos de atendimento ao cliente
	10 - Lançamento do produto	16 - Acompanhar o produto
		17 - Descontinuar o produto

**Table to 3:** simultaneous engineering application



The procedures for conducting product development required for the timber industry are based on Figure 3 from image 2, where due to the implementation of the Lean approach through simultaneous engineering. Thus, not all processes will be executed and not all activities listed in each PDP process will be developed for the timber industry object of this study.

Therefore, the following is a descriptive of the reasons why these procedures were defined, which will be used in the PDP in question (Figure 3):

1st Product Portfolio: It is necessary to understand the market to make companies not escape the fundamental opportunities for survival, such as the maximization of economic value, balance of the portfolio, reduction of risks and see which products are being sold to choose which company will manufacture and create the portfolio.

4th Strategic Product Planning: from the unfolding of the portfolio it is necessary to draw a future planning for this products, so there is no waste.

5th Project Planning: Plan the project as the whole how to define in detail the scope, schedule, technical feasibility, define performance indicators and identify all activities, resources for the project to follow with fewer possible errors.

6th Informational Project: It is the phase that has as objective to raise all the information of the Planmaneto to develop a more complex set of information possible, will be revised the scope of the product and the lifecycle, define the customer requirements regarding To the product, define the requirements of the product, specify the goals as: requirements with values and qualitative information and then monitor the economic viability.

9th Production Preparation: This process will be developed the production processes and the packaging design, because each product has the need for a more formulated packaging.

10th product launch: aims to put the product in the market, is developed the design of sales processes, distribution, customer service, technical assistance and marketing campaigns.

16th product Follow-up: necessary to understand how the product is being sold and used during the life cycle. Its main focus is to ensure the performance of the product in production and in the market thus identifying needs and opportunities for improvement and ensuring that it causes the smallest possible impact to consumers, the company and the environment.

17th Product Descontinuage: It is also a very important process for the product because it is the moment when the product has no more advantages and relevance from the economic or strategic point of view. It starts when a return from the customer occurs.

Othersyes, they were excluded from this process of PDP with Lean approach in the timber industry under study, the following procedures, with their justifications:

2nd Draft Project: It will not be developed because the product is already defined and in this step is defined the target price, product team leader and the dates of development, as the study is focused on the REGUFO does not need to pass in this process.

3rd Project plan: It will not be developed because in this step a document is generated as a guide for execution, having generic resources, tasks and deadlines.

7th Conceptual Design: It is not necessary to do a whole analysis of the product such as search, creation, representation, selection of solutions, architecture and drawings, because the product under study is the surplus of the main product (gross).

8th Detailed project: It is divided into cycles, click Detailing, cycle acquisition and cycle optimization, are the final specifications of the product and the end-of-life plan has no way to differentiate. The main objective is to continue the conceptual design, developing all product specifications.

11th document Released: It is not necessary to make a document to be released (the concept paper covers the needs).

12th Sales Processes Specification: It is not necessary to use this process because it is already done in the product launch.

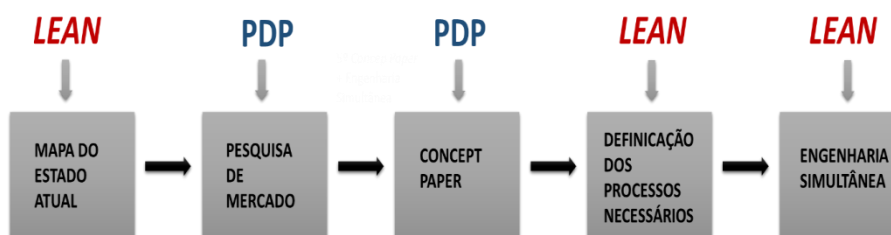
13th Distribution Processes Specification: it is not necessary to use this process because it is already done in the product launch.

14th Specification Technical Assistance processes: This process is not required for the product under study because the product is specific to a firing area.

15th Specification customer Service processes: No relationship with the customer is necessary, because the product commercialized will be the reuse of the product; where it is a "raw" material.

This was the procedure performed to obtain figure 4 and assemble a model with the process of product development and support of the Lean approach .

Table to 4: Model



## XI. Conclusion

The owners have extensive knowledge in the area of the timber industry and in relation to better uses of resources, but to the point that the costs of the process and the viability of the business carried out are not entirely clear to them.

With the realization of this study and its theoretical foundation, it was diagnosed details of the processes and a clearer view of the needs of improvements that were punctuated throughout this work, as well as the presentation of the best form of operation aggregating value for new business opportunities.

The mapping of the process of the current state of a timber company provided a broad vision to carry out the study of a product development process for this branch. This mapped information helped visualize the processes as a whole and realize the flow of value creation, where one can improve, where the activities are well executed and how to maximize the profits of the company.

After the map of the current state analyzed and understood it was necessary to conduct a market research to see which products this branch more commercializes and what they do with the scrap of the raw woods. It was possible to realize that the vast majority of companies see the timber industry as a source of income and sustainability of great importance to the market and that generate new products with scraps such as fire wood, biomass and caving, causing little waste. From the market research, with the products defined, the first step of the product development process was carried out to understand each one and obtain a process of product development for the timber industry.

Finally, a product development process model was developed with the help of the Lean approach, where it will help companies generate new business opportunities.

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